REMARKS

Claims 1-5 , 10 and 11 have been rejected under 35 U.S.C. §112, second paragraph for failing to particularly point out and distinctly claim the invention, based on a formal issue identified in item 2 on page 2 of the Office Action. In response to this ground of rejection, Applicants have amended claims 1 and 11 in a manner which addresses and is believed to resolve the cited formal issue. In particular, the expression "pre-mixed explosive material" has been changed to "pre-mix explosive material", as suggested by the Examiner. Accordingly, claims 1-5, 10 and 11 are now believed to be clear and definite, and reconsideration and withdrawal of this ground of rejection are respectfully requested.

Claims 1-2 and 10-12 have been rejected under 3 5 U.S.C. §103(a) as unpatentable over Donaghue (U.S. 4,369,689) in view of Hiorth (U.S. 4,191,480), and further in view of Halliday (U.S. 4,966,077). In addition, claim 3 has been rejected over the same three references and further in view of UK Patent GB 2 205 386 A, while claims 4 and 5 have been rejected under the same three references in further view of Pyle (U.S. 4,503,994). However, for the reasons set forth hereinafter, Applicants respectfully submit that all claims which remain of record in this application distinguish over the cited references, whether considered separately or in combination.

The Donaghue, et al reference has been described previously in the Remarks which had accompanied the amendment submitted September 28, 2006. Insofar, as pertinent for present purposes, it discloses a method for mixing two non-explosive materials to form an explosive mixture. In particular, one material is a liquid (isocyanite and polyol) while the other is in granular form (ammonium nitrite particles). As shown in Fig. 1, the granular nitrite particles are stored in a hopper from which they flow into a cylindrical casing 4 that contains a motor-driven auger 2. Inside the cylindrical casing 4, the particles are dispersed downward over the top of a cone shape deflector plate plate 5 which causes the flowing stream of solid particles to assume a hollow cylindrical configuration. The liquid materials are injected into the cylindrical casing for by a nozzle 6, which is situated within the cylindrical stream of solid particles. Thus, as the particles fall they are coated with a liquid material, so that the mass that is collected at the bottom of the casing is an even dispersing of ammonium nitrite particles and a matrix of polyurethane precursor. (See generally column 4, lines 32-58.)

The present application, as amended, on the other hand, defines an apparatus for mixing explosive materials which includes a reservoir of pre-mix explosive material; a reservoir of a hardener material, a static mixer, and separate piping associated with each of the reservoir for conveying the pre-mix

explosive material and the hardener material to the static mixer for mixing. In addition, claim 1 recites that the apparatus also includes a hydraulic cylinder and ram assembly that is coupled to apply controlled pressure to the pre-mix explosive material, for controlling the flow of pre-mix explosive material toward the static mixer.

The Donaghue, et al. reference discloses a mixing arrangement which differs in fundamental respects from the mixer of claim 1. In particular, it does not utilize a static mixer, nor does it provide a hydraulic cylinder and ram assembly for applying pressure to a pre-mix explosive material in order to deliver it to the static mixer through separate piping provided for that purpose, under pressure from the hydraulic cylinder.

The Hiorth reference has been cited as disclosing that it is know to use static mixers for mixing explosive materials. (See abstract). Accepting this characterization as accurate for the purpose of the present discussion, Applicants note that Hiorth fail to teach or suggest the use of a hydraulic cylinder to a pre-mix explosive material in the manner recited in claim 1.

The latter omission, however, is said to be remedied by the Halliday et al. reference. In particular, item 3 of the Office Action indicates that Halliday et al. teaches that it is known to provide a hydraulic cylinder and ram assembly that is

coupled to apply controlled pressure to a pre-mix explosive material upstream of a static mixer in order to control the rate of finished materials that exits the mixer. In support of this proposition, the Office Action refers to column 1, lines 40-65, column 3, line 59, column 4, line 4 and column 5, lines 29-69.

While Applicants agree that the Halliday et al reference does disclose apparatus for mixing an explosive material, they respectfully submit that it does not teach or suggest the provision of a hydraulic cylinder and ram assembly for controlling the flow of a pre-mix explosive material toward the static mixer, as recited in claim 1. Rather, it utilizes two pumps 12 and 16, both of which are recipricable piston and cylinder pumps, in order to pump the respective constituents through lines 24-54 , where they are mixed prior to being forced through a line 70 and nozzle 72. The two pumps in question, an emulsion based dosing pump 12 and gassing solution dosing pump 16, are referred to and discussed in the specification starting at column 3, line 54. At column 3, lines 59 and 60, the specification notes that the pump 12 "is of a reciprocal piston and cylinder type...". Similarly, as noted a column 4, lines 26-29, the dosing pump "has a cylinder 50 within which a piston [not shown] is reciprocable. "

The operation of the overall system is described at column 4, line 65-column 5, line 33. Switching on the air supply to the pipe 40 causes the motor 14 to operate by reciprocating its piston, thereby causing the piston rod 38 to

reciprocate, in the direction of the arrow 76 (Figure 2). This in turn causes the piston rod 18 to reciprocate in the direction of the arrow 76 and causes the pump 12 to operate. Furthermore, reciprocation of the piston rod 38 causes the piston in the cylinder 50 of the pump 16 to reciprocate correspondingly in synchronization therewith. (Column 5, lines 14-16). "The synchronization between the pumps 12 and 16 is such that a working stroke of the pump 12 coincides with a working stroke of the pump 16, so that doing such working strokes explosive base flows along the hose 24 and through the lines 70 and nozzle 72...". (column 5, lines 29-33).

As is apparent from the foregoing description, the reciprocating pump arrangements Halliday et al. are very different from the invention of claim 1, in which a hydraulic cylinder simply applies pressure to the pre-mix explosive material, causing it to flow through lines toward static mixer. Applicants respectfully submit that a person skilled in the art would readily understand that a hydraulic cylinder which applies pressure to a fluid on the one hand, differs fundamentally from a reciprocating pump on the other hand.

Moreover, this difference reflects far more than a mere design choice. It is noteworthy in this regard that the material which is caused to flow by the application of hydraulic pressure according to the invention is a pre-mix explosive material. Accordingly, as indicated in the specification at paragraph

[0031], certain types of apparatus for causing a flow cannot safely be used to pump such a material. In particular, the specification states at paragraph [0031] that "the hydraulic cylinder 6 and ram 8 assembly is far safer than using displacement pumps to pump the pre-mix explosive material to the static mixer 26. It is also to be noted that the pre-mix explosive material is not pumped to the static mixer as this may be too dangerous."

A significant feature of each Donaghue, et al. and Halliday, et al. in this regard is that none of the components which are mixed in either of the references are themselves explosive. That is, they do not comprise a fuel and an oxidizer. It is not until the action of mixing has actually been performed than an explosive material presents itself. See, for example, Halliday at column 7, lines 18-19 (the emulsion base is . . . primer-insensitive"); Halliday at column 7, lines 3-4 (the composition of gassing solution "compris[es] seven parts sodium nitrite for every thirteen parts by mass of water"; Donaghue at column 5, lines 1-4 (the explosive component comprises ammonium nitrite particles [*i.e.*, the oxidizer] which adsorb a small proportion of the liquid polyurethane precursor which will act as a fuel". Neither of these references discloses a mix component which comprises both an oxidizing agent and fuel, and accordingly, neither constitutes "a pre-mix explosive material". The significance of this distinction is not simply that the apparatus of the present invention operates on a different material than

is disclosed in the references. Rather, the important point is that the pump arrangement in Halliday would not be suitable for use in a system such as that of the present invention, because the use of such a pump would be unsafe. And of course, even if such a pump could be, and somehow were, used in the Donaghue et al apparatus, the result would not replicate the invention, for the reasons articulated previously.

To summarize, therefore, Applicants respectfully submit that claims 1-2, and 10-12 distinguish over the cited combination of Donaghue et al., Hiorth and Halliday et al. The pump apparatus as disclosed in Halliday et al, is incompatible with the Donaghue et al. structure and could not easily be incorporated therein. Moreover, because Halliday et al. does not teach or suggest the use of a hydraulic cylinder to apply pressure to the pre-mix explosive material as recited in claim 1, and the combination of these references would not yield the invention defined therein.

UK Patent GB 2 205 386 A, on the other hand, is cited only as disclosing an explosive mixer that utilizes a static mixer and channels the output into cartridge shells or other ordnance, while Pyle is said to disclose a fiber optic liquid level sensing device. Accordingly, Applicants respectfully submit that those features of claim 1 which are missing in both Donaghue, et al. and

Halliday, et al., are not taught or suggested by either of the later references either.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #038665.55361US).

Respectfully submitted,

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